Claims

1. A photoreactive device comprising:

a semiconductor having a conduction band with a potential and being capable of producing electrons under the irradiation of light on said semiconductor; and

an oxidation-reduction material having a redox potential being positive compared with said potential of said conduction band,

wherein said electrons produced by said semiconductor are supplied into said oxidation-reduction material under the irradiation of light so that said oxidation-reduction material is reduced with the crystalline structure of said material converted for storing said electrons in said material.

2. The device of claim 1, wherein said oxidation-reduction material is reduced in the presence of a cation.

3. The device of claim 1, wherein said oxidation-reduction material is an electrochromic material.

4. The device of claim 1, wherein said oxidation-reduction material is an oxide semiconductor which may be reduced to convert the crystalline structure of said oxide semiconductor to tungsten bronze structure.

5. The device of claim 1, comprising a substrate, a layer for storing electrons made of said oxidation-reduction material on said substrate, and a semiconductor layer made of said semiconductor on said substrate.

6. The device of claim 1, comprising a substrate, a layer for storing electrons made of said oxidation-reduction material on said substrate, and a porous semiconductor layer made of said semiconductor on said layer for storing electrons.

7. The device of claim 1, comprising a formed body made from

powder of said oxidation-reduction material and powder of said semiconductor.

8. The device of claim 2, comprising a conductor of a cation.

9. The device of claim 8, wherein said conductor is substantially insoluble in water.

10. The device of claim 1 for use in gaseous phase.

11. The device of claim 1, wherein the reflectance to visible light of said oxidation-reduction material may be changed when light is irradiated on said device.

12. The device of claim 1 for detecting light intensity of light irradiated on said device based on the change of a property of said oxidation-reduction material.

13. The device of claim 1 for detecting a humidity based on the change of a property of said oxidation-reduction material depending on said humidity.

14. A translucent member comprising a main body made of a translucent material and said photoreactive device according to claim 1 fixed to said main body.

15. The member of claim 14, wherein said member is a window.

16. An ornament comprising said photoreactive device according to claim 1.

17. An anticorrosive device for preventing the corrosion of a metal material, said device comprising:

a semiconductor having a conduction band with a potential and being capable of producing electrons under the irradiation of light on said semiconductor; and

an electrochromic material having a redox potential being positive compared with said potential of said conduction band,

wherein said electrons produced by said semiconductor are supplied into said electrochromic material under the irradiation of said light for storing said electrons in said electrochromic material, and wherein said electrons stored in said electrochromic material are supplied from said electrochromic material into said metal material after terminating the irradiation of said light.

18. The device of claim 17, comprising a layer for storing electrons made of said electrochromic material on said metal material, and a semiconductor layer made of said semiconductor on said metal material.

19. The device of claim 17, comprising a layer for storing electrons made of said electrochromic material on said metal material, and a porous semiconductor layer made of said semiconductor on said layer for storing electrons.

20. The device of claim 17, comprising a formed body made from powder of said electrochromic material and powder of said semiconductor.

21. The device of claim 17, comprising a first substrate and a second substrate, wherein said electrochromic material is provided on said first substrate, said semiconductor is provided on said second substrate and said electrochromic material and said semiconductor are electrically connected.

22. The device of claim 21, comprising a conductive layer between said first substrate and said electrochromic material.

23. The device of claim 21, comprising a conductive layer between said second substrate and said semiconductor.

24. A device for reducing oxygen molecules, said device comprising:

a semiconductor having a conduction band with a potential and being capable of producing electrons under the irradiation of light on said semiconductor; and

an oxidation-reduction material having a redox potential being

positive compared with said potential of said conduction band,

wherein said electrons produced by said semiconductor are supplied into said oxidation-reduction material under the irradiation of light to reduce said oxidation-reduction material with the crystalline structure of said material converted, and wherein said electrons are supplied from said oxidation-reduction material into oxygen molecules to reduce said oxygen molecules after terminating the irradiation of said light.

25. The device of claim 24, wherein said oxidation-reduction material is an electrochromic material.

26. The device of claim 24, comprising a substrate, a layer for storing electrons made of said oxidation-reduction material on said substrate, and a semiconductor layer made of said semiconductor on said substrate.

27. The device of claim 24, comprising a substrate, a layer for storing electrons made of said oxidation-reduction material on said substrate, and a porous semiconductor layer made of said semiconductor on said layer for storing electrons.

28. The device of claim 24, comprising a formed body made from powder of said oxidation-reduction material and powder of said semiconductor.

29. The device of claim 24, comprising a first substrate and a second substrate, wherein said oxidation-reduction material is provided on said first substrate, said semiconductor is provided on said second substrate and said oxidation-reduction material and said semiconductor are electrically connected.

30. The device of claim 29, comprising a conductive layer between said first substrate and said oxidation-reduction material.

31. The device of claim 29, comprising a conductive layer between said second substrate and said semiconductor.

32. The device of claim 24 for generating at least hydrogen peroxide

by reducing said oxygen molecules.

33. The device of claim 24 for controlling the growth of microorganisms.

34. A device for controlling the growth of microorganisms, said device comprising a metal oxide which may be reduced to form tungsten bronze crystalline structure, wherein said metal oxide is reduced and then oxidized to reduce oxygen molecules present near said metal oxide so that the growth of microorganisms is controlled.

35. The device of claim 34 for generating at least hydrogen peroxide by reducing said oxygen molecules.

36. The device of claim 34 comprising a electrical power supply for electrochemically reducing said metal oxide.

37. The device of claim 34, comprising a semiconductor having a conduction band with a potential and being capable of producing electrons under the irradiation of light on said semiconductor, wherein said metal oxide has a redox potential being positive compared with said potential of said conduction band, and wherein said electrons produced by said semiconductor are supplied into said metal oxide under the irradiation of said light to reduce said metal oxide.

38. The device of claim 37, comprising a substrate, a layer for storing electrons made of said metal oxide on said substrate, and a semiconductor layer made of said semiconductor on said substrate.

39. The device of claim 37, comprising a substrate, a layer for storing electrons made of said metal oxide on said substrate, and a porous semiconductor layer made of said semiconductor on said layer for storing electrons.

40. The device of claim 37, comprising a formed body made from

powder of said metal oxide and powder of said semiconductor.

41. The device of claim 37, comprising a first substrate and a second substrate, wherein said metal oxide is provided on said first substrate, said semiconductor is provided on said second substrate and said metal oxide and said semiconductor are electrically connected.

42. The device of claim 41, comprising a conductive layer between said first substrate and said metal oxide.

43. The device of claim 41, comprising a conductive layer between said second substrate and said semiconductor.